

UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Administration
Bureau of Entomology and Plant Quarantine
233 Forestry Bldg., Colo. A & M
Fort Collins, Colorado
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WINTER MORTALITY OF THE BLACK HILLS BEETLE,
ROOSEVELT NATIONAL FOREST, WINTER OF 1950-51

Since there were unusual weather conditions during the winter of 1950-51, a study was made of winter mortality of the Black Hills beetle on the Roosevelt National Forest.

The study was first started after sub-zero temperatures occurred in November 1950. At this time the larvae of the beetles still were active in infested trees.

Two areas of infestation were used at this time. One area was on Section 24, Township 9 North, Range 71 West. This area is about 10 miles east of Red Feathers Ranger Station. Ten infested trees were cut from five selected points on Section 24. Two bolts, 2 feet long, were taken from each of these trees. The lower bolts were cut from the base of the tree and the upper bolts were cut from the maximum height of infestation.

The second area from which bolts were taken was at Happy Hollow. This area is located on Sections 18, 19, Township 7 North, Range 70 West. The bolts cut from this area were selected the same as on Section 24.

The bolts from both areas were examined a few days after being cut, and mortality counts made from each bolt.

During the latter part of January and the first part of February 1951 the temperatures were again at sub-zero levels. The study was continued. The two areas at Section 24 and Happy Hollow were used again for sampling. Two other areas of infestation were included for sampling at this time, one on Hahn's Ranch 2 miles west of Stove Prairie, the other on Wisdom's Ranch 3 miles south of Stove Prairie. The bolts from these areas were brought into the Forest Insect Laboratory and mortality counts were made.

The infested areas sampled for winter mortality were all on the northern half of the Roosevelt National Forest with the areas farthest south being in and around Happy Hollow.

Results show the infested areas in and around Happy Hollow to have a higher degree of winter mortality than the Section 24 area. Recordings from the

Colorado A & M weather station show the temperatures were several degrees lower than recordings from the Red Feather Ranger Station during the January and February cold snap.

For all the areas combined, the mortality for the basal belts is about 50%, and the upper belts about 92%.

Temperature Records From Red Feather Ranger Station

November 1950	January 1951	February 1951
8 16° F.	26 36° F.	1 -29° F.
9 4° F.	27 -8° F.	2 1° F.
10 -16° F.	28 -18° F.	3 18° F.
11 10° F.	29 -20° F.	4 21° F.
12 18° F.	30 -14° F.	
	31 -21° F.	

Temperature from Colorado A & M Weather Station, Ft. Collins, Colo.

November 1950	January 1951	February 1951
8 18.6° F.	27 8.4° F.	1 -40.7° F.
9 0.8° F.	28 -10.5° F.	2 -15.2° F.
10 -15.9° F.	29 -11.8° F.	3 25.0° F.
11 16.6° F.	30 -6.8° F.	4 12.9° F.
12 17.1° F.	31 -19.7° F.	

Temperature from Rocky Mountain National Park, Estes Park, Colorado

November 1950	January 1951	February 1951
8 12.0° F.	27 12.0° F.	1 -39.0° F.
9 0.0° F.	28 -12.0° F.	2 7.0° F.
10 -25.0° F.	29 -17.0° F.	3 25.0° F.
11 22.0° F.	30 -9.0° F.	4 25.0° F.
12 15.0° F.	31 -13.0° F.	

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Black Hills Beetle Mortality in Ponderosa Pine on
Section 24, Roosevelt National Forest,
After Cold Snap of November 10, 1950

Tree Numbers	Height of Samples	Bark Thickness	Average Number of larvae Per 2 Sq.		Percent Mortality
			Foot Sample Dead	Foot Sample Alive	
1	4'	.76"	4.5	44.0	9.28
	24'	.41"	15.5	54.2	32.11
2	5'	.45"	5.5	52.0	9.57
	15'	.35"	39.3	34.7	55.20
3	4'	.76"	4.7	29.3	13.81
	15'	.53"	131.0	7.7	94.50
4	5'	.43"	36.7	39.5	48.20
	15'	.43"	34.2	32.5	51.30
5	5'	.67"	61.3	62.2	43.68
	15'	.55"	57.0	46.3	55.15
6	5'	.70"	59.7	49.0	54.81
	15'	.30"	78.3	0.5	98.10
7	2'	.82"	5.5	78.5	6.54
	25'	.40"	70.2	31.2	69.20
8	3'	.67"	55.5	32.8	62.80
	17'	.37"	37.5	5.0	88.20
9	2'	.65"	54.0	48.0	52.90
	20'	.37"	39.3	10.3	79.25
10	5'	1.00"	5.5	108.0	3.02
	15'	.70"	8.5	83.0	9.29

Mortality in 10 Basal Sections--32.50%
Mortality in 10 Upperbole Sections--58.20%

Black Hills Beetle Mortality In Ponderosa Pine at
Happy Hollow, Roosevelt National Forest,
After Cold Snap of November 10, 1950

Tree Numbers	Height of Samples	Bark Thickness	Average Number of Larvae Per 1 Sq. Foot Sample		Percent Mortality
			Dead	Alive	
1	8'	.70"	99.0	28.5	77.60
	10'	.46"	46.3	4.7	89.75
2	12'	.80"	85.8	22.2	79.30
	12'	.46"	31.0	25.7	54.75
3	21'	.77"	101.3	49.0	67.30
	21'	.33"	84.7	3.0	96.70
4	8'	.70"	95.7	38.7	71.10
	15'	.37"	84.3	6.3	93.00
5	8'	.47"	95.0	45.5	67.10
	18'	.33"	115.7	9.8	92.80
6	8'	.65"	87.7	28.0	75.80
	18'	.43"	93.7	10.0	90.02

Mortality in 6 Basal Sections--72.58%
Mortality in 6 Upper Dale Sections--88.53%

Black Hills Beetle Mortality in Ponderosa Pine
Wiedom Ranch, Roosevelt National Forest,
After Cold Snap of February 1, 1951

Tree Numbers	Height of Samples	Bark Thickness	Average Number of Larvae Per 1 Sq. Foot Sample			Percent Mortality
			Dead(E)*	Dead(L)**	Alive	
1	2'	.67"	22.7	15.0	78.7	32.28
	10'	.40"	94.8	30.0	6.6	93.40
2	2'	.65"	11.3	13.0	34.0	41.70
	12'	.37"	68.3	17.3	0.7	99.20
3	3'	.78"	3.2	8.5	48.3	21.75
	20'	.57"	46.3	8.0	11.0	82.25
4	4'	.40"	34.5	7.5	40.3	51.00
	14'	.30"	37.3	9.7	22.3	67.80
5	3'	.47"	51.3	9.5	23.2	72.75
	16'	.38"	61.5	7.8	10.8	86.50
6	4'	.50"	31.7	12.0	9.0	85.00
	30'	.20"	34.7	5.7	8.0	93.50

Mortality in 6 Basal Sections--44.20%
Mortality in 6 Upper Bole Sections--87.10%

*(E) Signifies mortality following November Cold Snap

*(L) Signifies mortality following February Cold Snap

Black Hills Beetle Mortality in Ponderosa Pine on
Hahn's Ranch, Roosevelt National Forest,
After Cold Snap of February 1, 1951

Tree Numbers	Height of Samples	Bark Thickness	Average Number of Larvae Per 1 Sq. Foot Sample			Percent Mortality
			Dead(B)*	Dead(L)**	Alive	
1	4'	.33"	98.0	12.0	7.8	93.50
	23'	.33"	76.0	6.8	0.0	100.00
2	4'	.57"	111.5	14.7	0.7	99.50
	17'	.33"	101.7	0.0	0.0	100.00
3	3'	.06"	46.5	12.0	12.5	75.20
	18'	.43"	102.7	1.7	1.5	98.90
4	3'	.47"	27.3	0.5	1.5	98.00

Mortality in 4 Basal Sections--92.6%

Mortality in 3 Upperbole Sections--99.50%

*(B) Signifies mortality following November Cold Snap

*(L) Signifies mortality following February Cold Snap

Black Hills Beetle Mortality in Ponderosa Pine on
Section 24, Roosevelt National Forest,
After Cold Snap of February 1, 1951

Tree Numbers	Height of Samples	Bark Thickness	Average Number of Larvae Per ½ Sq. Foot Sample			Percent Mortality
			Dead(E)*	Dead(L)*	Alive	
1	2'	1.00"	22.0	6.7	50.0	36.48
	17'	.50"	61.3	4.3	1.0	98.60
2	4'	.95"	41.5	6.0	42.0	51.90
	13'	.43"	71.8	3.5	9.0	89.35
3	3'	.62"	63.7	12.3	35.2	68.25
	13'	.37"	62.7	6.6	17.6	92.60
4	4'	.73"	44.5	5.0	35.7	58.20
	14'	.52"	102.7	2.0	9.0	92.10
5	4'	.80"	0.0	4.5	36.7	9.25
	19'	.37"	66.0	3.0	11.3	85.00
6	3'	.90"	1.0	5.7	72.2	8.48
	23'	.50"	127.3	9.6	12.7	91.50
7	2'	.52"	21.8	6.2	40.2	41.20
	18'	.30"	93.8	.75	1.0	99.00
8	3'	.60"	17.0	3.5	46.5	30.03
	14'	.40"	61.2	0.0	56.5	58.90
9	3'	.38"	83.0	3.5	13.3	86.60
	17'	.20"	105.7	1.5	1.5	98.60
10	3'	1.00"	5.5	.3	53.5	14.12
	17'	.50"	60.7	2.0	2.0	97.00

Mortality in 10 Basal Sections—40.45%
Mortality in 10 Upper Bole Sections—89.35%

*(E) Signifies mortality following November Cold Snap

*(L) Signifies mortality following February Cold Snap

Black Hills Beetle Mortality in Ponderosa Pine on
Happy Hollow, Roosevelt National Forest,
After Cold Snap of February 1, 1951

Tree Numbers	Height of Samples	Bark Thickness	Average Number of Larvae Per 1 Sq. Foot Sample			Percent Mortality
			Dead(B)*	Dead(L)*	Alive	
1	3'	.70"	19.5	8.5	90.5	47.50
	20'	.30"	31.3	7.3	2.3	94.50
2	3'	.70"	28.5	6.7	26.0	58.20
	12'	.33"	51.7	4.8	15.8	80.03
3	3'	.65"	44.0	9.3	10.0	84.20
	18'	.25"	29.0	1.7	0.0	100.00
4	3'	.80"	5.7	1.5	59.0	10.88
	19'	.47"	44.3	8.0	7.5	85.15
5	5'	.77"	35.2	15.5	15.8	76.30
	17'	.33"	45.3	8.3	0.7	96.60
6	3'	.85"	14.0	1.5	62.0	20.00
	14'	.36"	52.3	.7	2.5	95.80
7	2'	.93"	5.0	3.0	58.7	11.96
	12'	.60"	54.8	21.3	3.5	95.60

Mortality in 7 Basal Sections--43.76%
Mortality in 7 Upper Bole Sections--92.18%

*(B) Signifies mortality following November Cold Snap
*(L) Signifies mortality following February Cold Snap